# 1394 Standards and Specifications Summary

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# Credits

**This presentation is based on one prepared by:**

- Burke Henehan (TI) and Michael Johas-Teener (formerly Zayante and Apple, now Broadcom)

**Update by**

- Michael Scholles (Fraunhofer IPMS) and Dave Thompson (Agere Systems)

- Last update: April 2006

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# Outline

## Part 1: Overall status summary

- "Where we are, where we are going"

## Part 2: Detailed listing (only for reference)

- Organized into related groupings
- Help you to not waste time looking for applicable specifications
- Help make sure you do not overlook a specification that will affect you on your node or the node at the other end of the 1394 cable

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# Why so many 1394 specifications?

**IEEE 1394-1995 Provides Architecture and Fundamental Transport Services**

**Only a few enhancements to the standard:**

- Improved efficiency, better interoperability – 1394a-2000
- Higher Speeds/Longer Distances –1394b-2002
- Coexistence with Gigabit Ethernet on one cable – p1394c
- Bridging – 1394.1-2004
- Architecture – 1212-2001

**Many, many applications leads to many, many protocols:**

- Consumer – IEC 61883, AV/C, DPP, HAVI, 5C
- PC/business – OHCI, SBP-2, IP/1394, Wintel, Apple
- Others – industrial, instrumentation, automotive, aerospace

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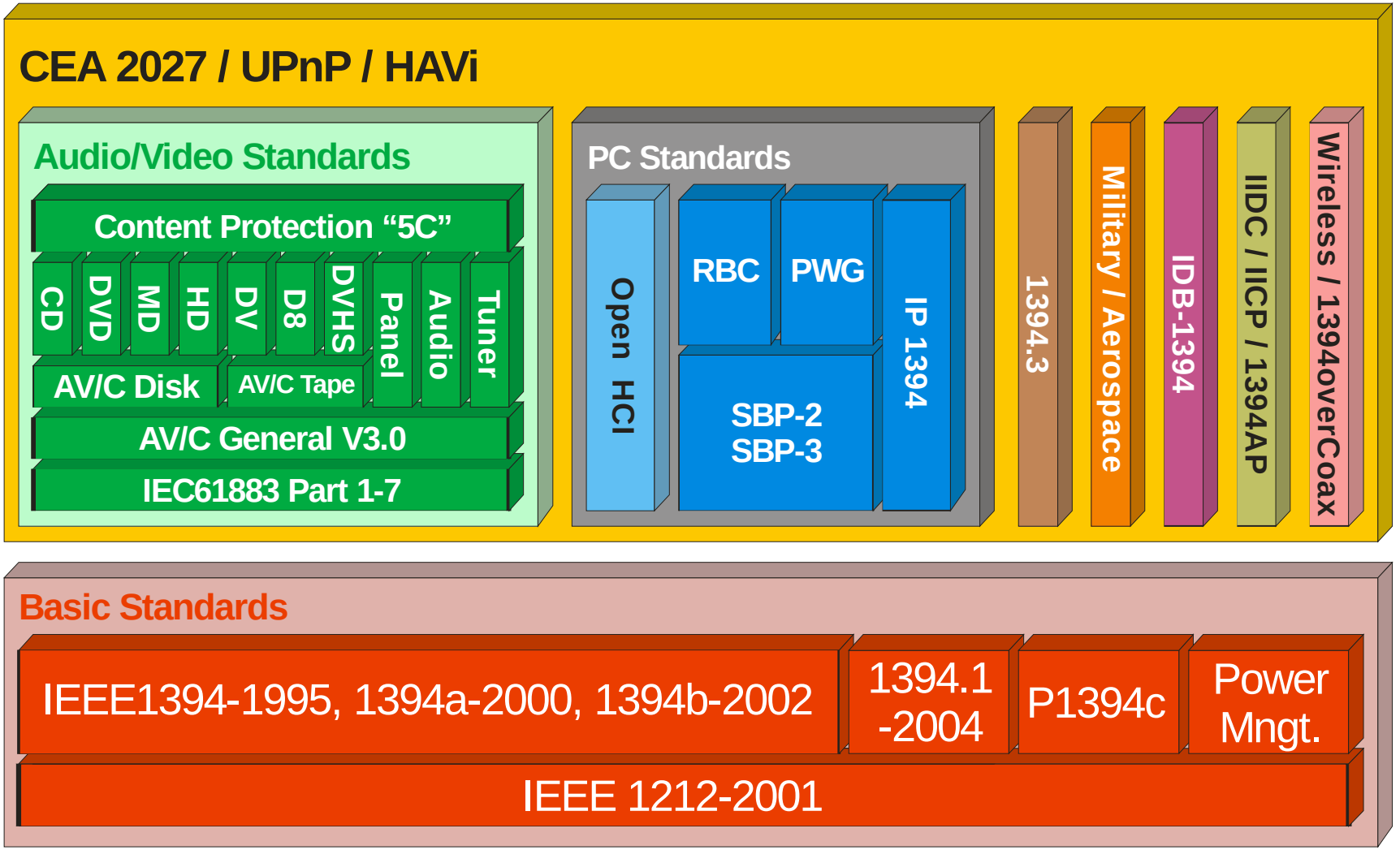
# Part 1: Outline

# General overview

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# 1394 enhancements

**IEEE 1394a-2000 brings clarifications, optimizations, codifies existing practice**

- **IEEE 1394b-2002 increases speed and distance**
  - Other physical media (CAT5, optical)
- **p1394c combines 1394 and GigE on one cable**
  - 800 MBit/s on Cat5 cables
- **IEEE 1394.1 extends to a large number of devices**
  - Bridge between two IEEE1394 buses

**IEEE 1212 fixes and simplifies the underlying architecture**

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# 1394a: basic improvements

**Arbitration acceleration**

- Much improved efficiency

- **Reset improvements**
- Fast reset, connection debounce
- Adding/removing nodes causes little or no interruption
- **Suspend/resume**
- Support for fine-grained power management

**Miscellaneous**

- 4-pin connector added
- PHY-Link interface completely specified

# 1394b: new technology

**Faster: 800 and 1600 Mbit/sec**

- Architecture for 3200 and up

**Longer distance**

- 100m using UTP at S100, POF at S200 (S400), GOF at S3200

**Better utilization of bus resources**

- Full duplex, Elimination of gaps for signaling certain bus states

**Cost reduced**

- "pure beta" has smaller, simpler, better connector
- Simpler analog portion of PHY
- Natural DC isolation
- PHY-Link integration fundamental design

**IEEE Standard Completed in 2002**

- Now used for storage, industrial cameras, home networking, …

# P1394c: 1394 & Ethernet

**Enabling 800 MBit/s on CAT5e cables**

- But: only 800 MBit/s, no other speeds
- Distance up to 100 m

**Coexistence with 802.3 (Ethernet)**

- Leveraging Gigabit Ethernet technology
- Two logical networks on one physical cable
- No bridging between 1394 and 802.3

**Standard to be published in 2006**

- Voting ended in April 2006 with affirmation

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# 1394.1: networks!

**Specifies connection between multiple 1394 busses**

- Model is “two portal” bridge
- Multiport bridges appear to be multiple two portal bridges from a protocol point of view

**Isochronous and asynchronous streams are maintained**

- Both multimedia and internet data
- Bus resets isolated to local busses

**IEEE Standard IEEE 1394.1-2004**

- Early implementations from NEC, Philips
- Intended to be used for Protocol Adaption Layer of Wireless 1394

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# 1212: fixing the foundation

**Old IEEE1212 standard wrong in many details**

- Conflicts with 1394-1995 and existing practice
- Many misinterpretations

**Configuration ROM updates**

- Functional descriptions improved
  - Feature and instance directories
- Extended keys
  - Much easier for other standards to extend 1212 formats

**Registers updated**

- Follow existing practice, tighter definition

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# Application-based specs

**Consumer-based**

- AV/C
- CEA
- Content protection
- DPP
- HAVi

**Others**

- Industrial automation
- Instrumentation
- Automotive
- aerospace

**PC-based**

- OHCI
- SBP-2
- IP/1394
- UPnP

**1394 on non-standard media**

- Wireless 1394
- 1394overCoax
- Home networks

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# AV/C is world of its own!

**Around 50 specs so far**

- Control of CE devices, grouped into classes (Camcorder, Tape, Disc, Tuner, Panel, Audio …)
- Based on Function Control Protocol (FCP) defined in IEC61883 Part 1
- Additionally, large number of specs for interopera-bility testing, but only for Japanese market so far

**Basically a good start**

- Simple fundamental design
- Maybe too simple for large 1394 clusters (w. bridges)

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# Content protection

- **DTCP (Digital Transport Copy Protection – “5C”)**
- **Has been implemented**
- **Licensing from DTLA required (Digital Transport Licensing Authority)**
  - Several implementations
  - Identical chipsets with and without DTCP support
- **DTCP available for number of buses and networks**
  - 1394, IP, MOST

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# Other consumer protocols

**BT601 over 1394**

- Uncompressed consumer video over 1394

- **IEC61883 Part2 – Part7**
- Data format for audio/video streaming over 1394 for different video sources

- **CEA**
- CEA embraces 1394 as a transport for OSD
- User Interface for Home Networks (CEA2027)

**HANA**

- Use of 1394 related standards for HD A/V distribution

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# PC Specifications

**Platform specs**

- Microsoft/Apple/Linux/Sun define of how to work with their platform
- Not always following the latest version of the standards
- OHCI for access to 1394 bus via memory based interface

**General specs**

- SBP-2 and SBP-3 for typical peripherals
  - Printers, scanners, mass storage, etc
- IP/1394 for peer-to-peer
  - Uses vast internet experience
- UPnP for generic discovery and control
  - Good support in Microsoft universe …

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# SBP-2 and SBP-3

**Best model for PC peripheral**

- Strongly preferred by both Microsoft/Apple/Linux
- Reduces interrupt load on PC, scalable DMA model

**RBC for mass storage**

- Subset of SCSI commands
- In use for Windows/Macintosh/Linux mass storage

**Protocol overhead in SBP-2 reduced by SBP-3**

- Also defines isochronous streams

# IP/1394

- **Carries internet protocol (IP) streams**
- **Specifies IPv4 (RFC2734) and DHCP (RFC2855)**
  - IPv6 (RFC 3146) in draft since 2001
- **Readily available**
  - All existing operating systems support IP/1394
- **Required for home and business networking**
  - UPnP needs it

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# Printing

**Three ways of printing for 1394:**

**1) IEEE1394.3-2003 / PPDT**

- Full use of SBP-2 protocols
- Used if printer is connected to PC
- memory mapped buffer model

**2) AVC**

- For peer-to-peer printing from CE devices

**3) DPP**

- AV/C had no asynch. transfer model, so DPP started

# Other specs

**Industrial and instrumentation**

- Uncompressed camera for machine vision (IIDC)
- IEEE 488 over 1394 for instrumentation (IICP)
- 1394AP for industrial real-time control

**Automotive**

- First applications will be entertainment system
- IDB 1394 Specification
- AMI-C documents

**Military and Aerospace**

- Special SAE standard for IEEE 1394b in these areas

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# Compliance Test Specs

**General:**

- Base 1394 Test Suite (electrical, protocol)
- Point-to-Point Private Plugfest Guidelines
- Cable & Connector Test spec.

**Device specific:**

- SBP-2 functional and network test spec.
- OHCI functional and network test spec.
- IIDC functional test spec.
- AV/C devices (but Japanese market only)

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# Part 2: Detailed Listings

# Detailed listings

**Grouping of standards for particular product areas:**

- Everyone
- General Audio/Video
- Digital Video (DV)
- MPEG Video
- Digital TV
- PC
- Mass Storage
- Other Audio/Video devices
- Automotive
- Industrial
- Networking
- Compliance

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# Standards for Everyone

- **IEEE 1394-1995**
- **IEEE 1394a-2000**
- **IEEE 1394b-2002**
- **p1394c**
- **IEEE 1212-2001**
- **IEEE 1394.1-2004**
- **1394 TA Power Specifications**

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# IEEE 1394-1995

- **Abstract: Mother of all 1394 Standards, defines fundamental architecture, services, hardware and software partitioning, etc**
- **Who needs it: Everyone doing any 1394**
- **Status: Released, supplemented by 1394a**
- **More Information: IEEE web page**
  - http://shop.ieee.org/ieeestore

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# IEEE 1394a-2000 Supplement

- **Abstract: Enhancements and corrections to 1394-1995, especially to physical layer, power management, and software details**
- **Who needs it: Everyone doing 1394**
- **Status: Released**
- **More Information: IEEE web page**
  - http://shop.ieee.org/ieeestore

# IEEE1394b-2002

**Abstract: Higher speed, longer distance version of 1394, backward compatible with 1394a, minimizes changes above PHY**

**Who needs it: Professional video/audio, PC high performance, home/multimedia networking, industrial control, instrumentation**

**Status: Released**

**More Information:**

- http://shop.ieee.org/ieeestore

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# p1394c

**Abstract: Coexistence of 1394b at S800 and Gigabit Ethernet on one network using CAT5 cables, no bridging between 1394 and Ethernet**

**Who needs it: PC high performance, home/multimedia networking, industrial control, instrumentation**

**Status: Ballot closed (April 2006) with affirmation**

**More Information:**

- http://grouper.ieee.org/groups/1394/c/

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# IEEE 1212-2001

**Abstract: Control and Status Register Standard.**

- **Used by 1394.**
- **Who needs it: All 1394 uses it, but primarily**
- **software driver writers need a copy**
- **Status: Released**
- **More Information:**
  - http://shop.ieee.org/ieeestore

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# IEEE1394.1-2004 Bridging

**Abstract: Issues and standardization of requirements for bridging one 1394 bus to another 1394 bus**

**Who needs it: Home network devices, industrial devices, etc.**

**Status: Released**

**More Information**

- http://shop.ieee.org/ieeestore

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# 1394 TA Power Spec Part 1: Cable Power Distribution

- **Abstract: Describes how nodes should supply, limit, pass, and consume cable power from 1394 cables for multiple ports**
- **Who needs it: All 1394 Nodes**
- **Status: Released**
- **More Information:**
  - http://www.1394ta.org/Technology/Specifications/Descriptions/TA_1999001-1.htm

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# 1394 TA Power Spec Part 2: Suspend/Resume

**Abstract: Describes how the power saving mechanisms of suspend/resume should be implemented and used.**

**Who needs it: PHY designers, Power Management SW writers**

**Status: Released**

**More Information:**

- http://www.1394ta.org/Technology/Specifications/Descriptions/TA-1999001-2.htm

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# 1394 TA Power Spec Part 3: Power State Management

**Abstract: Describes the Model to be used for managing power states within a 1394 node and across a 1394 bus.**

**Who needs it: System designers, Node SW writers**

**Status: Released**

**More Information:**

- http://www.1394ta.org/Technology/Specifications/Descriptions/T1999001-3-R95Final.htm

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# General Standards for Audio/Video

- **IEC-61883 part 1**
- **AV/C General Specification**
- **MPEG4 over 1394**
- **BT.601 over 1394**
- **IEC-61883 part 6**

**Audio & Music Protocol**

**Copy Protection**

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# IEC 61883-1

**Abstract: Standard that describes:**

- Isochronous Plug Control Registers
- Connection Management Protocol (CMP)
- Function Control Protocol (FCP)
- Common Isochronous Packet (CIP) headers

**Who needs it: Transport of isochronous data when using AV/C, DVC, MPEG, AMP**

**Status: Released**

**More Information:**

- http://www.iec.ch/webstore/

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# AV/C General Specification

**Abstract: Defines general commands used to control consumer audio/video electronics.**

- **Utilizes 1394 Unit architectures.**
- **Who needs it: Audio/video devices, SW driver writers.**
- **Status: Accepted by 1394 TA (version 4.2)**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# MPEG4 over 1394

- **Abstract: Technical report with necessary modifications of IEC 61884-4 for MPEG4 transport over 1394**
- **Who needs it: all devices sending MPEG4 streams over 1394**
- **Status: under development; Draft TS2006014**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# BT.601 over 1394

- **Abstract: Method of transmitting 4:2:2 YUV, 4:4:4 YUV, and 24 bit RGB formatted video signals, including ITU-R BT.601-5**
- **Who needs it: all devices sending data in above mentioned format over 1394**
- **Status: Released as TS2003003; being considered to become IEC61883-8**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# IEC 61883-6

**Abstract: Standard that describes Audio/Music Transport Protocol across 1394**

- **Who needs it: Devices transporting formatted Audio or Music streams over 1394**
- **Status: Released**
- **More Information:**
  - http://www.iec.ch/webstore/

# Audio and Music Protocol

**Abstract: Architecture to implement IEC-61883-6 along with how to distribute sampling clocks and manage nodes (also known as mLAN)**

**Who needs it: Musical Instrument Makers, SW writers.**

**Status: Released as TA2001024**

**More Information:**

- http://www.1394ta.org/Technology/Specifications
- http://www.yamaha.co.jp/tech/1394mLAN/mlan.html

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# Copy Protection: Digital Transmission Licensing Authority

- **Abstract: Third party licensing authority created to license the Intel, Sony, Matsushita (MEI), Hitachi and Toshiba (“5C”) digital transmission copy protection mechanism.**
- **Who needs it: All silicon providers and end equipment makers wishing to implement the “5C” (5 company) copy protection for content protection of video and perhaps audio.**
- **Status: Released (V1.4) Demonstrated in working silicon, setting up plugfests, etc.**
- **More Information:**
  - http://www.mpeg.org/1394

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# General Standards for Digital Video (DV)

- **IEC-61883 parts 1, 2, 3 & 5**
- **AV/C General Specification**
- **AV/C VCR Specification**

# IEC 61883-2

**Abstract: Standard that describes SD-DVCR Transport Protocol across 1394**

- **Who needs it: Devices transporting SD-DVCR over 1394 (current camcorders)**
- **Status: Released**
- **More Information:**
  - http://www.iec.ch/webstore/

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# IEC 61883-3

**Abstract: Standard that describes HD-DVCR Transport Protocol across 1394**

- **Who needs it: Devices transporting HD-DVCR over 1394**
- **Status: Released**
- **More Information:**
  - http://www.iec.ch/webstore/

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# IEC 61883-5

**Abstract: Standard that describes SDL-DVCR Transport Protocol across 1394**

- **Who needs it: Devices transporting SDL-DVCR over 1394 (High compression DV)**
- **Status: Released**
- **More Information:**
  - http://www.iec.ch/webstore/

# AV/C Tape Recorder/Player Subunit

- **Abstract: Enhancements to AV/C for an AV/C controlled VCR or camcorder.**
- **Who needs it: AV/C DVC Camcorder and VCR vendors, SW driver writers.**
- **Status: Accepted by TA as VCR subunit**
- **TA1998002, replaced by Tape Recorder subunit as TA 2004005**

**More Information:**

– http://www.1394ta.org/Technology/specifications

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# Standards for MPEG Video

- **IEC 61883-1, -4 and -7**
- **Digital Content Protection**
- **AV/C General Specification**

# IEC 61883-4

**Abstract: Standard that describes MPEG Transport Streams (TS) (including DVB TS) across 1394**

**Who needs it: Devices transporting MPEG over 1394 (Digital TV, STB, etc)**

**Status: Released**

**More Information:**

- http://www.iec.ch/webstore/

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# IEC 61883-7

**Abstract: Standard that describes MPEG Transport Streams (TS) for DSS (not quite the same as standard MPEG-2) across 1394**

**Who needs it: Devices transporting DSS MPEG over 1394 (Digital TV, STB, etc)**

**Status: Released**

**More Information:**

- http://www.iec.ch/webstore/

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# Standards for Digital TV

- **All Standards for MPEG**
- **All Standards for DV**
- **Consumer Electronics Association (CEA)**
- **Sub-committee R-4.8 Digital Interface Std 775-B**
- **ANSI/SCTE 26 (“Home Digital Network Interface**
- **Specification with Copy Protection”)**
- **AV/C Tuner Specifications**

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# CEA 775-B

- **Abstract: Describes the digital interconnection required for Digital TV On Screen Display(OSD)**
- **Who needs it: Designers of Digital TVs and 1394 devices that source digital data to digital TVs**
- **Status: Released**
- **More Information:**
  - http://www.ce.org/Standards/browseByCommittee.aspx

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# ANSI/SCTE 26
## (Home Digital Network Interface with Copy Protection)

**Abstract: Describes DTV/STB communication via EIA-775-A (control and stream definition) and EIA-799 (on screen display encoding) with content protection via DTCP ("5C")**

**Who needs it: US market STB and DTV vendors, useful for all DTV peripherals as well**

**Status: Release 3**

**More Information:**

- www.scte.org

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# AV/C Tuner General Model

**Abstract: AV/C controls for analog and digital video tuners, several subdocuments cover different modes.**

**Who needs it: Devices doing video tuning controlled across 1394**

**Status: Released as TA1998004, updated as TA1999035**

**More Information:**

- http://www.1394ta.org/Technology/Specifications/

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# AV/C Tuner DVB Video Model

**Abstract: AV/C control enhancements for Digital Video Broadcast (DVB) video tuners**

**Who needs it: Devices doing DVB video tuning controlled across 1394**

**Status: Released as TA1998005 with enhancements TA1999003**

**More Information:**

- http://www.1394ta.org/Technology/Specifications

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# AV/C Tuner Broadcast System Specification - ATSC Digital Television System (DTV)

- **Abstract: AV/C control CMDs enhancements for digital TVs**
- **Who needs it: DTV designers and SW driver writers**
- **Status: Released as TA1999033**
- **More Information:**
  - http://www.1394ta.org/Technology/Specifications

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# AV/C Tuner Analog Video Model

**Abstract: AV/C control enhancements for analog video tuners**

- **Who needs it: Devices doing analog video tuning controlled across 1394**
- **Status: Released as TA1998006**
- **More Information:**
  - http://www.1394ta.org/Technology/Specifications/

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# AV/C Tuner Analog Audio Model

**Abstract: AV/C control enhancements for analog audio tuners**

**Who needs it: Devices doing analog audio tuning controlled across 1394**

**Status: Released as TA1998007, enhanced as TA1999034**

**More Information:**

- http://www.1394ta.org/Technology/Specifications

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# More AVC devices

- Panel
- Monitor
- Changer
- Preset

**Printer**

**Camera**

**Disc**
**(see Section “Mass Storage”)**

**Diagnostics**

**Bulletin Board**

**Conditional Access**

**Camera Storage**

**MIDI Music**

**ITU-R BO. 1294 tuner**

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# AV/C Printer Subunit

**Abstract: Enhancements to AV/C for an AV/C controlled printer.**

- **Who needs it: AV/C Printer vendors, SW driver writers**
- **Status: Released as TA2003004**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# AV/C Camera Subunit

**Abstract: Enhancements to AV/C for an AV/C controlled digital camera.**

- **Who needs it: AV/C Digital Camera vendors, SW driver writers**
- **Status: Released as TA1998015**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

# AV/C Panel Subunit

**Abstract: Provides On-Screen Display to enable presentation to the user.**

- **Who needs it: GUI developers for AV/C device control presentation**
- **Status: Released as TA2005097**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# AV/C Monitor Subunit

**Abstract: Enhancements to AV/C for controlling a video monitor.**

- **Who needs it:  AV/C Monitor Makers and SW driver writers.**
- **Status:  Released as TA1999028**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# AV/C Changer Subunit

**Abstract: Provides standard means for controlling changer units (like for CDs)**

- **Who needs it: HW and SW designers of AV/C device using changers**
- **Status: Released as TA2000007**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# AV/C Preset Subunit

**Abstract: Provide a standard means of establishing presets across 1394 for AV/C devices**

**Who needs it: Target device SW developers for AV/C device control**

**Status: Accepted as TA1999021**

**More Information:**

- http://www.1394ta.org/Technology/specifications

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# AV/C Bulletin Board Subunit

**Abstract: Provide a method to provide information that can be shared with other devices on a 1394 network.**

**Who needs it: AV/C device HW and SW designers**

**Status: Accepted as TA1999005**

**More Information:**

- http://www.1394ta.org/Technology/specifications

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# AV/C Bulletin Board: Resource Schedule Type

**Abstract: The purpose of the Resource Schedule Board is to provide a location on a target device where other devices can post a schedule of the use of a target's resources. Devices on a 1394 network can then avoid resource-scheduling conflicts on that target device.**

**Who needs it: AV/C device HW and SW designers**

**Status: Accepted as TA1999006**

**More Information:**

- http://www.1394ta.org/Technology/specifications

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# AV/C Conditional Access Subunit Specification

- **Abstract: describes a generic functional block and command set that is compatible with multiple conditional access and broadcast systems.**
- **Who needs it: AV/C device HW and SW designers**
- **Status:  Accepted as TA 1999007**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# AV/C Camera Storage Subunit

- **Abstract: This specification defines a model and command set for handling of data files stored in a camera**
- **Who needs it: AV/C device HW and SW designers**
- **Status:  Accepted as TA2003005**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# AV/C Music Subunit 1.0

**Abstract: defines a model, data structure and command set for for electric musical instruments and/or professional audio equipment that have MIDI functionality when connected to 1394 bus.**

**Who needs it: AV/C device HW and SW designers**

**Status: Accepted as TA 2001007**

**More Information:**

- http://www.1394ta.org/Technology/specifications

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# AV/C Tuner Broadcast System - Rec. ITU-R BO. 1294 System B

- **Abstract: defines the data structures which are used by an AV/C tuner subunit that supports Rec. ITU-R BO. 1294 System B.**
- **Who needs it: AV/C device SW designers**
- **Status: Accepted as TA 1999004**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

# Specs for AV/C Management

- **Descriptors and Block Types**
- **Stream Format Information**
- **Connection and Compatibility Management**
- **Asynch. Connections**
- **Asynch. Connection management**
- **Isochronous rate control**
- **Audio control**
- **Synchronization**
- **Diagnostics**

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# AV/C Descriptor Mechanism

- **Abstract: defines AV/C general descriptors and information blocks and their protocol, which is a standard way for AV/C devices to share information.**
- **Who needs it: AV/C device HW and SW designers**
- **Status: Accepted as TA 2002013**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# AV/C Information Block Types Specification

**Abstract: This specification is a reference to general information block structures used in AV/C Devices supporting the AV/C Descriptor Mechanism.**

**Who needs it: AV/C device SW designers**

**Status: Accepted as TA 1999045**

**More Information:**

- http://www.1394ta.org/Technology/specifications

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# AV/C Stream Format Information Specification

- **Abstract: provides a command set to obtain the status of the specified isochronous plug related to the specified stream format information.**
- **Who needs it: AV/C device SW designers**
- **Status: Accepted as TA2001002**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# AV/C Connection and Compatibility Management

**Abstract: specifies a mechanism for Connection and Compatibility Management (CCM) between AV/C Devices on a 1394 network, and a command set to be used for it.**

**Who needs it: AV/C device HW and SW designers**

**Status: Accepted as TA 2002010**

**More Information:**

- http://www.1394ta.org/Technology/specifications

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# AV/C Asynchronous Connections

- **Abstract: Provides a means of efficiently moving data using asynchronous connections with AV/C commands.**
- **Who needs it: All AV/C devices using asynchronous data transfer**
- **Status: Released as TA2001009**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# AV/C Asynchronous Connection Management

**Abstract: Provides a means of making, breaking, and monitoring async connections in a similar way isochronous connections are managed.**

**Who needs it: devices that need to interoperate with AV/C devices but need asynchronous data transfer**

**Status: Released as TA2000006**

**More Information:**

- http://www.1394ta.org/Technology/Specifications

1394℠ TRADE ASSOCIATION

# AV/C Isochronous Rate Control

- **Abstract: Provides a means of managing Isochronous rate control with AV/C commands.**
- **Who needs it: AV/C devices that can vary their isoch data rates to meet system requirements**
- **Status: Released as TA1999015**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# AV/C Audio Control Model

**Abstract: Provides control for audio functions across 1394 using AV/C commands.**

- **Who needs it: Audio Instrument HW and SW designers**
- **Status: Released as TA1999008**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# AV/C Command for AV Synchronization

**Abstract: defines the command sets for synchronization of audio and video reproduction timing and describes how to apply for home theater systems.**

**Who needs it: AV/C device HW and SW designers**

**Status: Accepted as TA2005005**

**More Information:**

- http://www.1394ta.org/Technology/specifications

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# AV/C Command for Diagnostics

- **Abstract: Provide a standard means of starting and reporting the results of self test across 1394 for AV/C devices**
- **Who needs it: AV/C device control SW writers**
- **Status:  Accepted as TA1999019**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# PC standards

- **Open Host Controller Interface 1.1**
- **Microsoft 1394 Plug & Play Standard**
- **SBP-2**
- **SBP-3**
- **IEEE1394.3-2003**
- **Direct Printing Protocol**
- **IPover1394**

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# Open Host Controller Interface v1.1

- **Abstract: Defines common register sets and services for a generic host controller using DMA.**
- **Most implementations use PCI**
- **Who needs it: Silicon vendors, SW writers to chips compliant to OHCI.**
- **Status: Released, version 1.2 in development for 1394b support**

**More Information:**

– http://www.microsoft.com/whdc/system/bus/1394/OHCI.mspx

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# 1394 Plug & Play Specification

- **Abstract: Design reference to aid consistent implementation of devices compliant with IEEE 1394 to ensure interoperability**
- **Who needs it: Computer peripheral vendors, SW writers**
- **Status: Published by Microsoft**

**More Information:**

– http://www.microsoft.com/whdc/resources/respec/specs/1394PNP.mspx

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# Serial Bus Protocol 2 (SBP-2)

**Abstract: A transport protocol for asynchronous commands or data, now widely adopted by computer peripherals.**

**Who needs it: Computer peripherals or other heavy asynchronous data users**

**Status: Released as ANSI NCITS 325-1998**

**More Information:**

- ftp://ftp.t10.org/t10/drafts/sbp2/sbp2r04.pdf
- http://webstore.ansi.org/ansidocstore

1394 TRADE ASSOCIATION

# Serial Bus Protocol 3 (SBP-3)

**Abstract: A transport protocol for asynchronous commands or data and isochronous data, less overhead than SBP-2**

**Who needs it: Computer peripherals or other heavy asynchronous data users**

**Status: Released as ANSI NCITS 375-1994**

**More Information:**

- ftp://ftp.t10.org/t10/drafts/sbp3/sbp3r05.pdf
- http://webstore.ansi.org/ansidocstore

1394 TRADE ASSOCIATION

# IEEE1394.3-2003 Peer-to-Peer Data Transport

**Abstract: Protocol that uses SBP-2 for peer-to-peer data transport … provides multiple queues and bidirectional transport**

**Who needs it: 1394 Printers, scanners, multifunction devices**

**Status: Released**

**More Information:**

- http://shop.ieee.org/ieeestore

1394℠ TRADE ASSOCIATION

# Direct Printing Protocol

**Abstract: Protocol to enable peer to peer connections for image sources and sinks**

**Who needs it: Nodes doing peer to peer printing or communicating with nodes that do peer to peer printing**

**Status: Released as TA2000008**

**More Information:**

- http://www.1394ta.org/Technology/Specifications

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# Internet Protocol over 1394

**Abstract: Defines the transport of Internet Protocol Version datagrams. Defines the necessary methods, data structures and codes. Also DHCP protocols.**

**Who needs it: Devices using IP over 1394**

**Status: Accepted as RFC2734 (IPv4), DHCP as RFC2855, RFC 3146 (IPv6) still draft, enhancement to isochronous IP as draft TS2006003**

**More Information:**

- http://www.ietf.org/rfc.html

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# Standards for Mass Storage

- **SBP-2**
- **RBC Command Set**
- **AV/C General Specification**
- **AV/C Disc Model**
- **AV/C Disc Subunits:**
  - HDD Subunit
  - CD Subunit
  - Minidisc Subunit
  - DVD Subunit
  - DVR Blue Media Subunit
  - General Rec. Video Disc

# Reduced Block Commands (RBC)

- **Abstract: RBC provides a command set of reduced requirements from SCSI CMDs The initial focus is devices attached to the IEEE 1394 Bus and utilizing SBP-2.**
- **Who needs it: Storage Devices using SBP2**
- **Status: Released as ANSI/INCITS 330:2000**
- **More Information:**
  - ftp://ftp.t10.org/t10/drafts/rbc/
  - http://webstore.ansi.org/ansidocstore

1394 TRADE ASSOCIATION

# AV/C disc general specification

**Abstract: Enhancements to AV/C for mass storage disc units**

- **Who needs it: Disc storage using AV/C commands**
- **Status: Released as TA2002001**
- **More Information:**
  - http://www.1394ta.org/Technology/Specifications

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# AV/C disc: Hard disc Device Type

**Abstract: Enhancement of AV/C disc model for hard disc drives format.**

- **Who needs it: Hard disc devices utilizing AV/C commands**
- **Status: Accepted as TA2001023, enhancements to disc Subunit as TA1999029**

**More Information:**

– http://www.1394ta.org/Technology/Specifications

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# AV/C Disc: CD and SACD Media Type

- **Abstract: Enhancement of AV/C disc model for compact disc and Super Audio CD format.**
- **Who needs it: Compact Disc devices utilizing AV/C commands**
- **Status: Accepted as TA1999002, Super Audio CD enhancement TA2001016**
- **More Information:**
  - http://www.1394ta.org/Technology/Specifications

1394 TRADE ASSOCIATION

# AV/C disc: Minidisc Media Type

**Abstract: Enhancement of AV/C disc model for minidisc format.**

**Who needs it: Minidisc devices utilizing AV/C commands**

**Status: Accepted as TA1998014, enhancements to disc Subunit as TA2000003**

**More Information:**

- http://www.1394ta.org/Technology/Specifications

1394 TRADE ASSOCIATION

# AV/C Disc Media Specification – DVD

**Abstract: describes the DVD media-specific part of the Disc General Subunit Specification**

- **Who needs it: DVD device developers**
- **Status: Accepted as TA2000001**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

1394 TRADE ASSOCIATION

# AV/C Disc Subunit - DVR Blue Media Type Specification

- **Abstract: defines the DVR-Blue media type specification for the AV/C Disc subunit. This document is used in conjunction with the AV/C Disc General Specification.**
- **Who needs it: DVR Blue Media device developers**
- **Status: Accepted as TA2001013**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# AV/C Disc Subunit - Generic Recordable Video Disc

- **Abstract: describes the Generic Recordable Video Disc media type specific part of the Disc General Subunit Specification.**
- **Who needs it: AV/C device HW and SW designers**
- **Status: Accepted as TA2002002**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

# Standards for Automotive

- 1394 Automotive Specification (IDB-1394)
- PMD for Fiber Optic Wake-on-LAN
- AMI-C Physical Layer Specification
- AMI-C Draft Common Message Set
- AMI-C Draft Power Management Architecture
- AMI-C Draft Power Management Specification
- AMI-C Draft Power Management EPoC System Description
- AMI-C Draft Power Management Test Document

1394℠ TRADE ASSOCIATION

# 1394 Automotive Specification (IDB-1394)

**Abstract: Physical and protocol layer for 1394 implementations inside passenger cars**

**Who needs it: everyone designing 1394 automotive solutions**

**Status: Accepted as TA2001018, IDB-CU as 2004001, HPCF as 2006012 (under development)**

**More Information:**

- http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# PMD for Fiber Optic Wake-on-LAN

**Abstract: describes an implementation of sleep and wake functions for fiber optic transceivers and specifies fiber optic transceiver dimensions for automotive applications.**

**Who needs it: everyone designing 1394 automotive solutions**

**Status: Accepted as TA2004024**

**More Information:**

- http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# AMI-C Physical Layer Specification

**Abstract: describes environmental conditions and tests to be applied to automotive 1394 compliant electrical and electronic equipment and some subcomponents directly mounted in or on the vehicle.**

**Who needs it: everyone designing 1394 automotive solutions**

**Status: Accepted as AMI-C 4001 1.10; will become TA document in 2006**

**More Information:**

- www.ami-c.org
- http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# AMI-C Draft Common Message Set

**Abstract: defines a message set for power management commands sent over a 1394 bus in passenger cars**

- **Who needs it: everyone designing 1394 automotive solutions**
- **Status: Accepted as AMI-C 2002 1.0.2; will become TA document in 2006**

**More Information:**

- www.ami-c.org
- http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# AMI-C Draft Power Management Architecture

**Abstract: provides the architectural specification for realization of a Host Centric Power Management in 1394-Automotive Networks using an electrical control signal for changing the power state of the Network.**

**Who needs it: everyone designing 1394 automotive solutions**

**Status: Accepted as AMI-C 3013; will become TA document in 2006**

**More Information:**

- www.ami-c.org
- http://www.1394ta.org/Technology/specifications

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# AMI-C Draft Power Management Specification

- **Abstract: describes functional specification at system and unit level for an in-vehicle 1394 network and includes Specification for System, for Host unit, for Device unit, for Communication Protocol between units, and for legacy devices**
- **Who needs it: everyone designing 1394 automotive solutions**
- **Status: Accepted as AMI-C 3023; will become TA document in 2006**

**More Information:**

- www.ami-c.org
- http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# AMI-C Draft Power Management EPoC System Description

- **Abstract: outlines the EPoC (Embedded Proof of Concept) system of Power Management Specification for IEEE1394 devices and describes the components (hardware and software) of this system, the interfaces between each component, and a rough description of the manner of operation.**
- **Who needs it: everyone designing 1394 automotive solutions**
- **Status: Accepted as AMI-C 3033; will become TA document in 2006**
- **More Information:**
  - www.ami-c.org
  - http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# AMI-C Draft Power Management Test Document

**Abstract: describes the test approaches, test set up and test cases, which have been used during the AMI-C –EPoC for the successful demonstration of power management capability of EPoC.**

**Who needs it: everyone designing 1394 automotive solutions**

**Status: Accepted as AMI-C 3034; will become TA document in 2006**

**More Information:**

- www.ami-c.org
- http://www.1394ta.org/Technology/specifications

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# Standards for Industrial and Military

- **Industrial & Instrumentation Digital Camera**
- **Industrial/Instrumentation control**
- **IEEE 488 over 1394**
- **1394 Automation Protocol**
- **1394b for Military Applications**

# Industrial & Instrumentation Digital Camera V1.31

- **Abstract: Protocol for setup and control as well as data format of industrial cameras delivering uncompressed video streams**
- **Who needs it: Industrial camera vendors and Software driver developers**
- **Status: Accepted as TA2003017**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# Industrial & Instrumentation Control Protocol

- **Abstract: Communication protocol similar to AV/C for industrial automation and instrumentation communications**
- **Who needs it: Industrial automation & instrumentation vendors**
- **Status: Accepted as TA1999016**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# IEEE 488 over 1394 Industrial & Instrumentation Control Protocol

- **Abstract: Protocol to transport IEEE 488 commands over IEEE 1394**
- **Who needs it: Industrial & Instrumentation HW and SW designers**
- **Status: Accepted as TA1999017**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# 1394 Automation Protocol

- **Abstract: Protocol for synchronized control and data exchange for industrial devices like sensors, actors, motors, …**
- **Who needs it: Industrial & Instrumentation HW and SW designers**
- **Status: Accepted as TA2005099**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# 1394b for Military Applications

**Abstract: establishes the requirements for the use of IEEE-1394b as a data bus network in military and aerospace vehicles; defines the concept of operations and information flow on the network.**

**Who needs it: everyone who has to integrate 1394b in military or aerospace**

**Status: Published as SAE-AS5643**

**More Information:**

- http://www.sae.org

1394 TRADE ASSOCIATION

# Standards for Compliance

- Base 1394 Test Suite Definition
- 1394 Connector and Cable Compliant Testing Criteria
- OHCI Test Specification
- SBP-2 Mass Storage Test Specification
- IIDC Functional Conformance Test Specification
- Interface Implementation Guidelines for AV/C
- Interface Implementation Test Specifications for AV/C
- Point-to-Point Private Plugfest Guidelines Revision 1.0
- Test specification of self-test for AV Devices 1.0

1394℠ TRADE ASSOCIATION

# Base 1394 Test Suite Definition

- **Abstract: defines basic electrical and protocol tests to examine compliance of device under test with 1394 standard**
- **Who needs it: everyone**
- **Status: Accepted as TA2002005**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# 1394 Connector and Cable Compliant Testing Criteria

**Abstract: establishes the performance requirements for connectors and cables assemblies manufactured according to IEEE Std 1394-1995 and IEEE1394a-2000.**

**Who needs it: everyone producing 1394a cables**

**Status: Accepted as TA2004003**

**More Information:**

- http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# OHCI Test Specification

**Abstract: defines compliance test procedures for devices that implement OHCI specification for access to 1394 bus**

**Who needs it: every developer for OHCI related products**

**Status: under development as TA2006013**

**More Information:**

- http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# SBP-2 Mass Storage Test Specification

**Abstract: defines compliance test procedures for SBP-2 compliant mass storage devices**

- **Who needs it: every developer for SBP-2 related HW or SW**
- **Status: under development as TA2006006**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# IIDC Functional Conformance Test Specification

**Abstract: describes the test specification to check conformity of an IIDC camera device to the IIDC 1394 based Digital Camera specifications.**

**Who needs it: every developer of IIDC relatedHW or SW**

**Status: Accepted as TA2004004**

**More Information:**

- http://www.1394ta.org/Technology/specifications

1394 TRADE ASSOCIATION

# Interface Implementation Guidelines for AV/C

**Abstract: Guidelines how to correctly build different types of AV/C devices; so far only for Japanese market**

- **Who needs it: every AV/C device manufacturer**
- **Status: Accepted as TA 2003001(AV-HDD); TA 2003015 (Blu-ray); TA2002012 (DV); TA2002019 (D-VHS); TA2002015 (STB Sat.); TA2003006 (STB Terr.) TA2002017 (TV Sat.); TA2003008 (TV Terr.) TA2006004 (TV ATSC) TA2006005 (OSD)**

**More Information:**

- http://www.1394ta.org/Technology/specifications

1394 TRADE ASSOCIATION

# Interface Implementation Test Specifications for AV/C

**Abstract: Compliance and Interoperability test procedures for various AV/C devices; also only for Japanese market**

- **Who needs it: every AV/C device manufacturer**
- **Status: Accepted as TA2003002 (AV-HDD);**
- **TA2003016 (Blu-ray); TA2002014 (DV); TA2002020**
- **(D-VHS); TA2002016 (STB Sat.); TA2003007 (STB Terr.); TA2002018 (TV Sat.); TA2003009 (TV Terr.)**

**More Information:**

- http://www.1394ta.org/Technology/specifications

1394℠ TRADE ASSOCIATION

# Point-to-Point Private Plugfest Guidelines

- **Abstract: defines procedures for interoperability tests of two 1394 devices during point-to-point tests at 1394TA plugfests.**
- **Who needs it: everyone attending a 1394TA plugfest**
- **Status: Accepted as TA2002006**
- **More Information:**
  - http://www.1394ta.org/Technology/specifications

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# Test specification of self-test for AV Devices

**Abstract: defines the way to self-test "Point-to-Point Test" and "Network Test" of AV devices among four tests defined in 1394 TA Compliance Logo Program.**

**Who needs it: every AV manufacturer who becomes Self-Test House**

**Status: Accepted as TA2003012**

**More Information:**

- http://www.1394ta.org/Technology/specifications

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# Standards for Networking

**CEA standards**

- VHN Home Network Specification
- User Interface for Home Networks Using Web-based Protocols

**DVB networks**

- **ETSI TS 101 225**Digital Video Broadcasting (DVB); Home Local Network
- **ETSI TS 102 813** Digital Video Broadcasting (DVB); IEEE 1394 Home Network Segment

**HAVI**

**Wireless 1394:**

- Protocol Adaptation Layer for IEEE 1394 over IEEE 802.15.3
- ETSI Hiperlan/2 standards

1394 TRADE ASSOCIATION

# Video Electronics Standards Association Home Network

- **Abstract: Creating a document describing the physical layers, data link layers, mid-layer protocols and associated services for a Home Network**
- **Who needs it: Home Networking Vendors**
- **Status: Published by CEA as CEA 851-A**
- **More Information:**
  - http://www.ce.org
  - http://global.ihs.com

1394 TRADE ASSOCIATION

# User Interface for Home Networks

**Abstract:defines a user-to-machine interface method allowing a source of home-network services and enables user control of networked devices via another device's web browser graphical user interface (GUI).**

- **Who needs it: Home Networking Vendors**
- **Status: Published by CEA as CEA 2027-A**

**More Information:**

- http://www.ce.org
- http://global.ihs.com

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# Digital Video Broadcasting: 1394 Home Network Segment

**Abstract: the document concentrates on how IP traffic for DVB services will be carried over IEEE1394 technology. This covers the encapsulation of IP packets in the IEEE 1394 Serial Bus packets**

**Who needs it: SW developers for home networking systems**

**Status: released as ETSI TS 102 813**

**More Information:**

- http://pda.etsi.org/pda/queryform.asp

1394 TRADE ASSOCIATION

# Digital Video Broadcasting: Home Local Network

**Abstract: standardizes the topology, physical interfaces and a complete stack of protocols for the Home Local Network (HLN) based on 1394. This includes the specification of the APIs that an application on an HLN device can use to access the services provided by this HLN device or any other HLN device, as well as a Java language binding for these APIs.**

**Who needs it: SW developers for home networking systems**

**Status: released as ETSI TS 101 225**

**More Information:**

– http://pda.etsi.org/pda/queryform.asp

1394 TRADE ASSOCIATION

# Home Audio Video Interoperability Architecture (HAVi)

- **Abstract: lightweight distributed object system for CE & computing devices, highly compatible with current generation AV/C devices**
- **Who needs it: Next generation consumer electronic devices and associated infrastructure**
- **Status: 1.1 spec complete**
- **More Information:**
  - http://www.havi.org

1394 TRADE ASSOCIATION

# HAVi CTS and Unit SW Version

- **Abstract: This document that defines the allowable Command set codes to be used with HAVi, i.e. a list of acceptable sets.**
- **Who needs it: Devices using the HAVi Architecture**
- **Status: Released as TA1998018**
- **More Information:**
  - http://www.1394ta.org/Technology/Specifications
  - http://www.havi.org

1394 TRADE ASSOCIATION

# Protocol Adaptation Layer for IEEE 1394 over IEEE 802.15.3

**Abstract: This document specifies methods to mimic IEEE 1394 infrastructure (using the facilities of IEEE Std 802.15.3-2003 and implement IEEE P1394.1 bridge behaviors in the same domain.**

**Who needs it: Developers for Wireless 1394 devices**

**Status: Released as TA2003010**

**More Information:**

- http://www.1394ta.org/Technology/Specifications

1394℠ TRADE ASSOCIATION

# Specific Convergence Sublayer (SSCS) for Hiperlan/2

- **Abstract: Specification of a IEEE 1394 service specific sub-layer which provides a method of transporting IEEE 1394 isochronous and asynchronous packets as well as timing information.**
- **Who needs it: SW developers for Wireless 1394 devices**
- **Status: released as ETSI TS 101 493-3**
- **More Information:**
  - http://pda.etsi.org/pda/queryform.asp

1394 TRADE ASSOCIATION

# IEEE 1394 Bridge Specific sub-layer for Hiperlan/2

**Abstract:Specification of a IEEE 1394 convergence sublayer Service Specific sub-layer which provides a method of transporting IEEE 1394 isochronous and asynchronous packets as well as timing information for a bridge capable device.**

**Who needs it: SW developers for Wireless 1394 devices**

**Status: released as ETSI TS 101 493-4**

**More Information:**

- http://pda.etsi.org/pda/queryform.asp

1394 TRADE ASSOCIATION

# Conformance testing for Hiperlan/2 SSCS

- **Abstract: Abstract Test Suite (ATS) specification for the HIPERLAN/2 packet based convergence sublayer common part**
- **Who needs it: SW developers for Wireless 1394 devices**
- **Status: released as ETSI TS 101 811-3**
- **More Information:**
  - http://pda.etsi.org/pda/queryform.asp

1394 TRADE ASSOCIATION

# Conformance testing for the Hiperlan/2 Bridge sub-layer

**Abstract: Abstract Test Suite (ATS) specification for the HIPERLAN/2 1394 based convergence layer**

**Who needs it: SW developers for Wireless 1394 devices**

**Status: released as ETSI TS 101 811-4**

**More Information:**

- http://pda.etsi.org/pda/queryform.asp

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